

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Mark S. Knighton, et al.

Application No.: 10/830, 210

Filing Date: April 21, 2004

For: **HAND HELD PORTABLE THREE-  
DIMENSIONAL SCANNER**

Examiner: Duy M. Dang

Group Art Unit: 2624

Confirmation No.: 9038

**APPEAL BRIEF**

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P.O. Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

The Applicants (hereinafter "Appellants") submit the following Appeal Brief, pursuant to 37 C.F.R. § 41.37 for consideration by the Board of Patent Appeals and Interferences. The Appellants also submit herewith a check in the amount of \$540.00 to cover the cost of filing the opening brief as required by 37 C.F.R. § 41.37(a)(2). Please charge any additional amount due or credit any overpayment to deposit Account No. 02-2666.

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## **I. REAL PARTY IN INTEREST**

Mark Knighton, Peter J. DeLaurentis, William D. McKinley and David S. Agabra, individuals identified in the above caption, assigned their interest in the present application to NextEngine, Inc. of Santa Monica, CA, which is recorded at reel/frame 015260/0940. Thus, NextEngine, Inc. is the real party in interest.

## **II. RELATED APPEALS AND INTERFERENCES**

There are no other appeals or interferences that will directly affect, be directly affected by or have a bearing on the Board's decision in this Appeal.

## **III. STATUS OF CLAIMS**

Claims 20-34 are pending in the application. The Examiner has rejected claims 20-34. The Appellants hereby appeal the rejections of claims 20-34.

## **IV. STATUS OF AMENDMENTS**

No amendments were submitted after the final Office Action.

## **V. SUMMARY OF CLAIMED SUBJECT MATTER**

Claim 20 recites an apparatus capable of three dimensional (3D) imaging from one vantage point independent of profilometry comprising (pg. 15, line 27 – pg 16, line 10; Abstract); a housing having a physical terminus (pg. 4, lines 28 – pg. 5 line 14. Fig. 1); an image sensing array (ISA) (pg. 10, lines 22-28); and an optical element in optical communication with the ISA (pg. 4, lines 14 and 15, page 5, lines 12 and 13), wherein all light received by the apparatus for 3D imaging and any light emitted by the apparatus for 3D imaging passes through a physical terminus of the apparatus at which

point a maximum separation between any two light rays used for 3D imaging does not exceed 2 inches (Fig. 2A and 2D, pg. 7, line 26 -, pg. 9, line 15).

Claim 23 recites wherein three dimensional imaging is independent of time of flight of light reflected from the location to the image sensing array (ISA) (pg. 15, line 27 – pg. 16, line 10).

Claim 24 recites wherein the three dimensional imaging is performed without requiring motion of the physical terminus of the apparatus (pg 15, line 27 – pg. 16, line 10).

Claim 25 recites wherein the three dimensional imaging method is stereoscopy (pg. 14, line 23).

Claim 26 recites comprising a wireless data link (Fig. 1, item 109, pg. 7, lines 15-30).

Claim 27 recites wherein the illumination source can vary an incident angle of light impinging on a target surface (pg. 7, line 5-25).

Claim 33 recites wherein the 3D image can be made of a target surface that appears substantially homogeneous unless captured at finer than 300 pixels per inch resolution as measured at the target surface (pg. 12, line 4, pg. 23, line 2).

Claim 34 recites wherein the 3D image can be made of a target surface that appears substantially homogeneous to an unaided human eye (pg. 28, lines 5-25).

## **VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

The issues involved in this Appeal are as follows:

A. Whether claims 1-26 are unpatentable under 35 U.S.C. § 103 as obvious over U.S.

Patent Publication No. 2002/0060669.

All of the claims do not stand or fall together. The basis for the separate patentability of the claims is set forth below.

## **VII ARGUMENT**

### **A. Overview of the Prior Art**

The Examiner rejected the Appellants' claims over one reference. This reference is introduced below.

#### **1. Overview of Sze**

Sze discloses a system providing a virtual input device such as a virtual keyboard or virtual trackball. See paragraphs [0029] and [0030]. Sze provides a method of detecting interaction with the virtual input device while avoiding detection errors known in the prior art. See paragraph [0017]. The system of Sze relies on hardware that captures images of a region of interest using a light emitter and pixel detector array. See paragraph [0029]. The region of interest that is imaged is a three dimensional space defined by a plane of the virtual input device and the space immediately above that plane. See paragraph [0029], [0038], and [0043]. Sze tracks the time of flight for the light emitted to determine X, Y, Z coordinates. See paragraph [0004]. The light is tracked from an emitter 20 and captured at a pixel detector array 70. See Fig. 1.

Sze does not disclose the relative positioning or distance between the light emitter and pixel detector array. Sze does not disclose the use of stereoscopy. Sze does not disclose the use of a wireless data link. Sze does not disclose an emitter that can vary its angle of light output. Sze does not disclose a controller to change optical paths.

### **B. Claims rejected under 35 U.S.C § 103**

Claims 20-34 stand rejected under 35 U.S.C. § 103 as allegedly being unpatentable over U.S. Patent Publication No. 2002/0060669 by Sze (hereinafter "Sze").

The Supreme Court noted that the analysis supporting a rejection under 35 U.S.C. § 103 must be made explicit. The Court quoting *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006), stated that "[r]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385, 1396. The Examiner has not presented a clear line of reasoning to establish a *prima facie* case of obviousness under *KSR*.

*Independent claim 20; Dependent claims 21, 22, 31 and 32*

In regard to claim 20, this claim includes the elements of "wherein all light received by the apparatus for 3D imaging and any light emitted by the apparatus for 3D imaging passes through a physical terminus of the apparatus at which point a maximum separation between any two light rays used for 3D imaging does not exceed 2 inches." The Examiner acknowledges that "Sze does not explicitly teach the separation between two light rays used for 3D imaging does not exceed 2 inches." See page 4 of the final Office action. To cure this defect of Sze, the Examiner appears to rely on some implicit disclosure of Sze arguing that the region of interest discussed in paragraph [0029] of Sze range up from the vertical plane 12mm. See page 4, of the final Office action. The Examiner argues based on this alleged disclosure of Sze that:

[i]t would have been obvious to one of ordinary skill in the art to recognize that 12mm does not exceed 2 inches as well as the tip of the stylus would no [sic] exceed 2 inches. Thus the separation between any two light [sic] received and emitted from stylus does not exceed 2 inches. Furthermore, it would have been obvious to one of ordinary skill in the art to recognize that the separation of any two light rays emitted and received shown [sic] in figure 1 does not exceed 2 inches.

See page 4, of the final Office action. The Examiner attempted to clarify this position in the response to arguments section on page 3 of the final Office action:

the “12mm” referenced in the rejection section (and described at par. [0029]) refers to the dimension of the region of interest which is part of the virtual input device 100. This region of interest is imaged/captured by the emitting light (emitter 20) and reflecting [sic] back (see lines 2-5). Since the region of interest is 12mm (about 0.472 inch) so [sic] the separation between any two lights (one emitting light and one reflecting light) can not be more than 12mm or 0.472 inch which is less than claimed “does not exceed 2 inches) [sic] (note: imaging a region of interest has two edges (edge 1 and edge 2) and the separation between the two edges is 12mm; thus, separation between emitting light at edge 1 and reflecting light at edge 2 does not exceed 12 mm or 0.472 inch).

The Examiner’s arguments are based on numerous mischaracterizations of Sze, misreading of the claim language and conjecture unsupported by Sze. The Appellants will address those issues most salient to a fair review of the application of Sze to these limitations of claim 20.

First, the Examiner has appeared to ignore the explicit language of the claims that recite “a **physical terminus** of the apparatus at **which point** a maximum separation between any two light rays used for 3D imaging does not exceed 2 inches” (emphasis added). The Examiner’s position regarding the distance between light rays involved in 3D imaging is based on an alleged dimension of a region of interest that is being imaged, not a physical terminus of an apparatus that captures the light or emits the light. In other words, the Examiner is arguing that at the point of the imaged surface the light rays are less than 2 inches apart. However, the Examiner’s argument and extended hypothetical regarding the dimensions and edges of the region of interest are entirely off base as they have no relation to the distance between light rays at the physical terminus at which point the separation is measured as recited in the claim.

Further, the Examiner’s characterization of the 12 mm dimension in paragraph [0029] of Sze is completely divorced from what is actually disclosed. The Examiner appears to assume that a two dimensional square space is being defined in conjecturing about two edges having 12mm dimensions. However, the paragraph clearly discusses imaging an area that is the vertical plane of the virtual input device and the area “upward for perhaps 12 mm or so.” Thus, a three dimensional space with a y-axis

of “12 mm or so” is described. No dimensions are provided for the x and z axis defining the vertical plane of the virtual input device. A reasonable assumption would make the virtual input device the size of the real world corollary i.e., a keyboard or trackball. Again, the size of the virtual input device is not germane to an analysis of the claim as the claimed dimension is at the “physical terminus of the apparatus,” which is the same apparatus that encompasses an image sensing array and an optical element.

The Examiner points to figure 1 and the illustrated elements therein, discusses a “stylus” and makes cryptic statements regarding these aspects of Size as somehow rendering the 2 inch dimension of claim 1 obvious. See page 4 where the Examiner states “the tip of the stylus would no [*sic*] exceed 2 inches” and “the separation between any two light [*sic*] received and emitted from stylus does not exceed 2 inches.” However, a stylus is an instrument that would be interacting with the virtual input device (see paragraph [0030]) and which would not be emitting light.

Further, the Appellants note that figure 1 of Size clearly shows a gap between the emitter 20 and the pixel detectors 70. No dimensions are provided to describe the gap and none can be inferred from the drawings alone as there is no indication that they are drawn to scale. See MPEP § 2125. The Examiner has not set forth a clear articulation of how Size renders the elements of claim 1 obvious, for the foregoing reasons. Thus, the Appellants submit that the examiner has not established a *prima facie* case of obviousness for claim 20.

Accordingly, it is requested that the obviousness rejection of this claim be overturned.

Claims 21, 22, 31 and 32 depend from claim 20 and incorporate the limitations thereof. Thus, at least for the reasons mentioned above in regard to claim 20, these claims are also patentable over Size. Accordingly, it is requested that the obviousness rejection of these claims be overturned.



### *Dependent claim 23*

With respect to claim 23, this claim depends from claim 20 and incorporates the limitations thereof. Thus, at least for the reasons mentioned above in regard to claim 1, this claim is not obvious over the cited reference. This claim includes additional limitations and is not obvious over the cited reference and is separately patentable for the reasons set forth below.

This claim includes the elements of “wherein three dimensional imaging is independent of time of flight of light reflected from the location to the image sensing array (ISA).” The Examiner rejected these claims based on figure 1, stating “see items 80 and light rays 50 shown in figure 1, for example, and there is no dependent [*sic*] between the two.” This is the entirety of the Examiner’s rationale for rejecting this claim. Nothing related to the method for 3D imaging can be discerned or inferred from the figure 1, which shows nothing more than that there is pixel detector array 80 which captures rays of light reflected off an object 40. In fact, the description of figure 1 in paragraph [0004] directly contradicts the Examiner’s position. Paragraph [0004] describing figure 1 states “[w]ithin array 80, each imaging sensor 70 i,j ... calculates total time of flight (TOF).” Thus, the Examiner has failed to establish that the elements of claim 23 are obvious over Sze, because the Examiner has not established that these elements of claim 23 are disclosed in Sze.

Accordingly, it is requested that the obviousness rejection of claim 23 be overturned.

### *Dependent Claim 24*

With respect to claim 24, this claim depends from claim 20 and incorporates the limitations thereof. Thus, at least for the reasons mentioned above in regard to claim 20, this claim is not obvious over the cited references. This claim includes additional limitations, is not obvious over the cited reference and is separately patentable for the reasons set forth below.

Claim 24 includes the elements of “wherein the three dimensional imaging is performed without requiring motion of the physical terminus of the apparatus.” The Examiner rejects the claims as obvious citing figure 1 and 2 and stating “there is no motion required for items 60 and/or 20.” However, the Examiner directly contradicts this position while attempting to justify the rejection of a subsequent claim stating the following in reference to figure 1 “object 40 is circular so the image of object 40 is captured by either object 40 is moving around the 3D imager 10 or 3D imager 10 is [*sic*] moving around the circular object 40.” See page 5 of the Office action. The idea of capturing the object 40 by moving it around the device 10, does not seem possible. The imaging device can’t capture something moving around it, because it has a lens 60 pointed in one direction, there is no possible methodology that could capture the object 40 if it were moved behind the device. Perhaps the Examiner had intended to take a different position, but the Appellants are unable to discern the position from the language utilized by the Examiner. This leaves only the movement of the device 10 itself; movement of the device necessarily moves the physical terminus. Therefore, the Examiner has not set forth a clear articulation as to how claim 24 is rendered obvious over Sze. Thus, this claim is separately patentable and it is requested that the obviousness rejection be overturned.

Claims 28 and 29 depend from claim 24 and incorporate the limitations thereof. Thus, at least for the reasons set forth above, claims 28 and 29 are not obvious over Sze. Accordingly, it is requested that the obviousness rejection of claims 28 and 29 be overturned.

#### *Dependent Claim 25*

With respect to claim 25, this claim depends from claim 20 and incorporates the limitations thereof. Thus, at least for the reasons mentioned above in regard to claim 20, this claim is not obvious over the cited reference. This claim includes additional limitations, is not obvious over the cited reference and is separately patentable for the reasons set forth below.

Claim 25 recites “wherein the three dimensional imaging method is stereoscopy.” The Examiner cites figure 1 and states “object 40 is circular so the image of object 40 is captured by either object 40 is moving around the 3D imager 10 or 3D imager is moving around the circular object 40 and such moving refers to claimed “stereoscopy.” First, the idea that the object 40 is being modeled in three dimensions in its entirety and that the device 10 is capable of this is not disclosed in Sze, thus, the Examiner’s position is entirely conjecture. Second, the Examiner has provided no support for equating such a scanning of an object with stereoscopy. It is well known to those skilled in the art that stereoscopy involves the combination of two or more images to create a three dimensional effect. There is no discussion of using such a technique, in fact, as noted above, paragraph [0004] appears to indicate that time of flight is the method for three dimensional imaging. Therefore, the Examiner has not established a clear rationale for the obviousness of the elements of claim 25 based on Sze. Accordingly, it is requested that the obviousness rejection of claim 25 be overturned.

#### *Dependent Claim 26*

With respect to claim 26, this claim depends from claim 20 and incorporates the limitations thereof. Thus, at least for the reasons mentioned above in regard to claim 20, this claim is not obvious over the cited reference. This claim includes additional limitations, is not obvious over the cited reference and is separately patentable for the reasons set forth below.

Claim 26 includes the elements of “[t]he apparatus ... further comprising a wireless data link.” The Examiner has cited the “stylus shown in figure 7 which is wirelessly connected to imager 10’.” This is the entirety of the rationale for rejecting claim 26 provided by the Examiner. The stylus in figure 7 is the user controlled object 110 discussed throughout Sze. It is the entire point of Sze to use the device 10 to detect the movement of the object 110 by imaging to implement a virtual input

device. Even a cursory review of Sze makes this clear. There is no description of any user controlled object 110 containing any internal electronics much less the electronics necessary to establish a wireless **data** link with the device 10. Similarly, the Examiner has provided no citation to any reference establishing that the device of Sze is capable of wireless data communication. Therefore, the Examiner has failed to establish a *prima facie* case of obviousness for this claim. Accordingly, it is requested that the obviousness rejection of claim 26 be overturned.

*Dependent Claim 27*

With respect to claim 27, this claim depends from claim 20 and incorporates the limitations thereof. Thus, at least for the reasons mentioned above in regard to claim 20, this claim is not obvious over the cited reference. This claim includes additional limitations, is not obvious over the cited reference and is separately patentable for the reasons set forth below.

Claim 27 includes the elements of “wherein the illumination source can vary an incident angle of light impinging on a target surface.” The Examiner rejected this claim based on figure 1 and figures 3A-C, see page 5 of the final Office action. The Examiner states “[n]ote the movement in figure 1 and pointed [*sic*] above as applied to claim 24 generates various incident angle of light impinging on the target surface of the object 40.” However, as discussed above there is no discussion of movement of the device in the sections describing figure 1 and no illustration of movement in figure 1. Figures 3A-C illustrate different types of distortion errors in imaging that are unrelated to any movement. See paragraphs [0007] and [0008]. Again, the Examiner’s rejection is entirely devoid of support. Therefore, the Examiner has failed to establish a *prima facie* case of obviousness for claim 27. Accordingly, it is requested that the obviousness rejection of these claims be overturned.

### *Dependent Claim 30*

With respect to claim 30, this claim depends from claim 20 and incorporates the limitations thereof. Thus, at least for the reasons mentioned above in regard to claim 20, this claim is not obvious over the cited reference. This claim includes additional limitations, is not obvious over the cited reference and is separately patentable for the reasons set forth below.

Claim 30 includes the elements of “a controller to automatically vary an optical path of the light rays used to capture a three dimensional image.” The Examiner rejects claim 30 citing the CPU illustrated in figure 5. The Examiner provides no clarification as to how the illustrated CPU reads on these elements of the claim. The Examiner has provided no evidence that the CPU in any way affects the optical path of light used in capture. Rather, the CPU is described in Size as performing “intersection” analysis (see paragraph [0038]) and coordinate transformations (see paragraph [0033]). The Appellants have been unable to discern any part of Size that would indicate that the CPU does anything other than post-capture image processing. Thus, the Examiner has failed to establish a *prima facie* case of obviousness for claim 30. Accordingly, it is requested that the obviousness rejection of claim 30 be overturned.

### *Dependent Claims 33 and 34*

With respect to claims 33 and 34, these claims depends from claim 20 and incorporate the limitations thereof. Thus, at least for the reasons mentioned above in regard to claim 20, these claims are not obvious over the cited reference. These claims includes additional limitations and are not obvious over the cited reference and are separately patentable for the reasons set forth below.

Claims 33 and 34 include the elements of “wherein the 3D image can be made of a target that appears substantially homogeneous unless captured at finer than 300 pixels per inch resolution as measured at the target surface” and “wherein the 3D image can be made of a target surface that

appears substantially homogeneous to an unaided human eye.” The Examiner relies on the same rationale for rejecting both of these claims, namely that paragraph [0009] discloses an example image array that is 100x100. However, the size and number of pixels in an imaging area does not have any specific correspondence to a resolution at a target surface. The image array size is only one component of such a calculation where the characteristics of the lighting source and lens system are equally important. For example, if the lens is unable to focus 300 of the pixels or more of the array on a one inch square area of a target surface, then the limitations of the claim are not met. The Examiner has provided no evidence that the device of Size is capable of this resolution of capture at a target surface in terms of lens capabilities. Thus, the Examiner has failed to clearly articulate a basis for a *prima facie* case of obviousness for these claims. Accordingly, it is requested that the obviousness rejection of these claims be overturned.

For at least the forgoing reasons, it is respectfully requested the rejection of claims 20-34 based on 35 U.S.C. § 103 be overturned.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

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Melissa Stead 6-30-09  
Melissa Stead Date

## **VIII. CLAIMS APPENDIX**

The claims involved in this Appeal are as follows:

1. – 19. (Canceled)

20. An apparatus capable of three dimensional (3D) imaging from one vantage point independent of profilometry comprising:

a housing having a physical terminus;

an image sensing array (ISA); and

an optical element in optical communication with the ISA,

wherein all light received by the apparatus for 3D imaging and any light emitted by the apparatus for 3D imaging passes through a physical terminus of the apparatus at which point a maximum separation between any two light rays used for 3D imaging does not exceed 2 inches.

21. The apparatus of claim 20 wherein a capture end further comprises:  
an illumination source.

22. The apparatus of claim 20 wherein the optical element is one of a lens, a reflector, and a light guide.

23. The apparatus of claim 20 wherein three dimensional imaging is independent of time of flight of light reflected from the location to the image sensing array (ISA).

24. The apparatus of claim 20 wherein the three dimensional imaging is performed without requiring motion of the physical terminus of the apparatus.

25. The apparatus of claim 24 wherein the three dimensional imaging method is stereoscopy.

26. The apparatus of claim 20 further comprising a wireless data link.



27. The apparatus of claim 21 wherein the illumination source can vary an incident angle of light impinging on a target surface.
28. The apparatus of claim 24 wherein the three dimensional imaging method performs captures of data from at least two points of view to a target.
29. The apparatus of claim 28 wherein at least two captures are performed sequentially by a same ISA.
30. The apparatus of claim 20 further comprising a controller to automatically vary an optical path of the light rays used to capture a three dimensional image.
31. The apparatus of claim 20 further comprising a display to visualize the data collected.
32. The apparatus of claim 31 wherein visualized data guides a user in the capture of a target surface.
33. The apparatus of claim 20 wherein the 3D image can be made of a target surface that appears substantially homogeneous unless captured at finer than 300 pixels per inch resolution as measured at the target surface.
34. The apparatus of claim 20 wherein the 3D image can be made of a target surface that appears substantially homogeneous to an unaided human eye.
35. – 60. (Canceled)

**IX. EVIDENCE APPENDIX**

No evidence is submitted with this Appeal Brief.

**X. RELATED PROCEEDINGS APPENDIX**

No related proceedings are attached herewith.